13. Visualising Solid Shapes

Exercise 13.1

1. (a) Vertices = A, B, C, D, E, F, G, H.

(b) edges with length 6 cm = AB, EF, DC and HG.

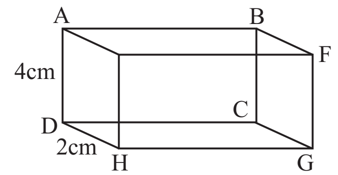
(c) edges with length 4 cm = AD, EH, BC, FG.

(d) edges with length 2 cm = AE, DH, BF and CG.

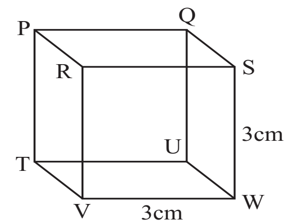
(e) faces with side 6 cm and 4 cm = $ABCD, EFGH$

(f) faces with sides 6 cm and 2 cm = $AEBF$ and $DHGC$

(g) faces with sides 4 cm and 2 cm = $AEHD$ and $BFGC$

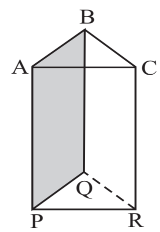


2. Cube has 8 vertices, 12 edges and 6 faces.



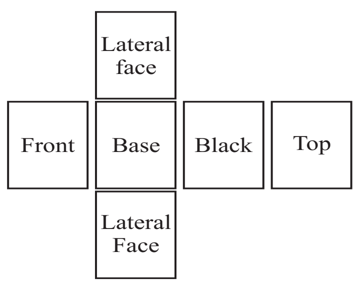
3. Base $\rightarrow QPR$

One lateral face $\rightarrow ABQP$

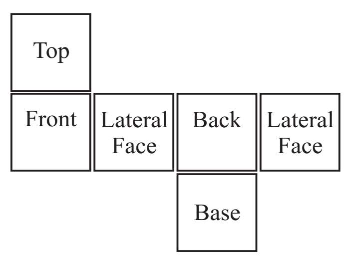


4. **Net of a cuboid :**

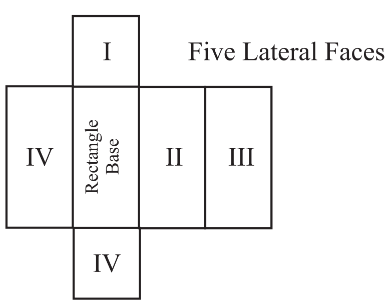
If we cut a solid along some its edges in such a way that all the faces of the solid can be said flat on a plane, keeping all the faces inter linked, it forms a net.



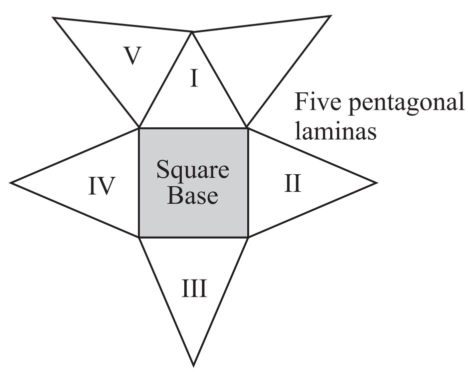
(a) net of a cuboid



(b) net of a cube.

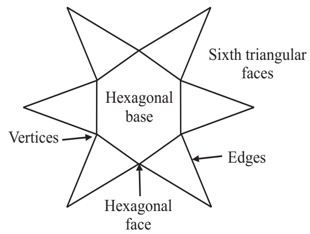


(c) a prism with a rectangular base

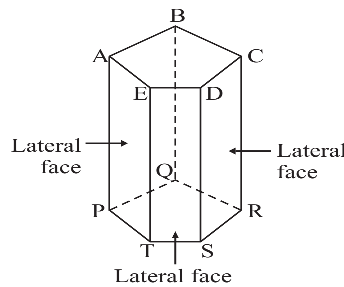


(d) a pyramid with a pentagonal base.

5.



1 hexagonal base and 6 triangular faces.
It base 7 vertices, 7 faces and 12 edges.



6. Number of lateral face = 5
(i) $AEPT$,
(ii) $EDST$,
(iii) $DCRS$,
(iv) $BCRQ$
(v) $BQPA$
Hidden faces $\rightarrow$ $ABQP$ and $BCRQ$
Visible faces $\rightarrow$ $AETP, EDST, DCRS$

7. Euler's formula $V + F - E = 2$

(a) **triangular prism**
Number of faces = 5 Number of vertices = 6
Number of edges = 9 Number of edges = 9
Verification :

$$V + F - E = 2$$
$$6 + 5 - 9 = 2$$
$$11 - 9 = 2$$
$$2 = 2, \quad \text{L.H.S. = R.H.S.}$$

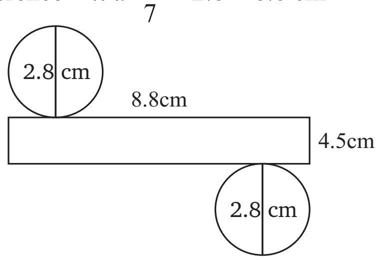
(b) **a cube**
Number of faces = 6 Number of edges = 12 Number of vertices = 8
then, $V + F - E = 2$
$$8 + 6 - 12 = 2$$
$$14 - 12 = 2$$
$$2 = 2, \quad \text{L.H.S. = R.H.S.}$$

(c) a hexagonal pyramid
Number of vertices = 7 Number of faces = 7 Number of edges = 12
Verification

$$V + F - E = 2$$
$$7 + 7 - 12 = 2$$
$$14 - 12 = 2$$
$$2 = 2, \quad \text{L.H.S. = R.H.S.}$$

8. Cylinder has 2 circular and 1 curved face.
Net for cylinder height = 4.5 cm
$\because$ Diameter = 2.8 cm
$\therefore$ Circumference = $\pi \, d \, \frac{22}{7} \times 2.8 = 8.8$ cm

Then



9. (i) Cone (ii) Cube (iii) Cylinder.

10. $l = 8\,\text{cm}$, $b = 8\,\text{cm}$, $h = 6\,\text{cm}$

Volume of cuboid $= l \times b \times h$

$= (8 \times 5 \times 6)\,\text{cm}$

$= 240$ cu. cm.

side of cube = 1 cm.

the volume of cube $= 1 \times 1 \times 1 = 1$ cm.

then

Number of cubes that can be fit into cuboid $= \dfrac{\text{Volume of coboid}}{\text{Volume of cube}}$

$= \dfrac{240\text{cu. cm}}{1\text{cu. cm}} = 240$ cubes.

11. **Fill in the blanks :**

(a) The other name of a tetrahedron is **triangular pyramid.**

(b) A rectangular pyramid has **5** faces.

(c) The name of the figure which has 5 faces, 6 vertices and 9 edges is **Triangular prism.**

(d) A rectangular prism is also called **cuboid.**

(e) Two faces of a solid meet in a **line segment** called edge.

(f) A cube has **12** edges and **8** vertices.

(g) A cone has one **circular** face and one **curved** face.

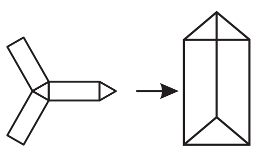
(h) A point where three surfaces of a solid meet is called a **vertex.**

12. **State True or False :**

(a) False (b) False (c) True

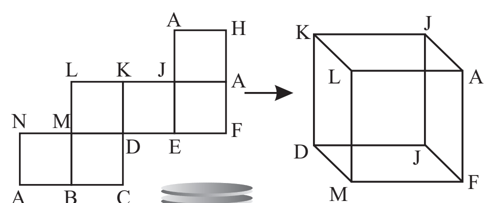
(d) True (e) False (f) False

13. (i)



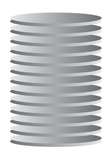
Triangular prism

(ii)



Cube

14. Cylinder 10 ₹ coins make a cylinderical shape.



15. (a) *AH* eets *AN* (b) *DC* meet *DE*

Exercise 13.2

1. Do it yourself. 2. Do it yourself. 3. Do it yourself.

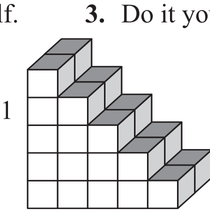
4. **Figure 1**

Number of cubical blocks

based $= 2 \times 5 + 2 \times 4 + 2 \times 3 + 2 \times 2 + 2 \times 1$

$= 10 + 8 + 6 + 4 + 2$

$= 30$ blocks



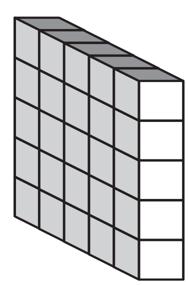


Figure 2

Number cubical blocks used $= 5 \times 5 = 25$ blocks.

5. Do it yourself. 6. Do it yourself.

7. (i) Shape of English alphabet *F*. (ii) Shape of English alphabet *T*.

8. Circular

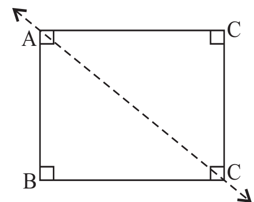
9. (a) True (b) False.

MCQ's

1. (b) **2.** (d) **3.** (b) **4.** (a) **5.** (c) **6.** (a) **7.** (b) **8.** (c) **9.** (b) **10.** (b).

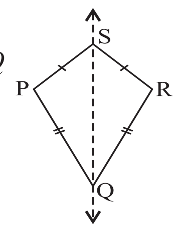
14. Symmetry

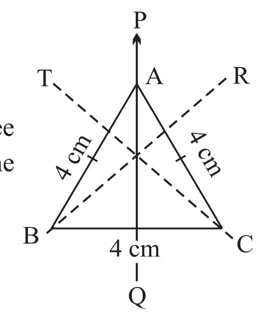
Exercise 14.1



1. (i) The sides corresponding to AB and BC are CD and DA.
The angle corresponding to $\angle ABC$ is $\angle ADC$.

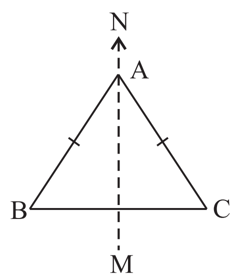
(ii) The sides corresponding to SP and PQ are SR and RQ respectively.



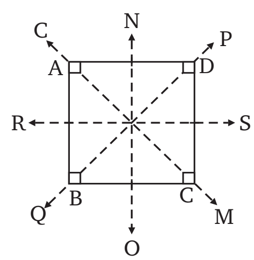


2. (a) The lines of symmetry are PQ, RS and TU the three bisectors which are also perpendicular bisectors of the sides of the triangle.
There is no point of symmetry.

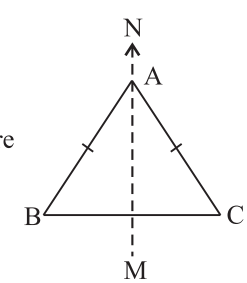
(b) The line of symmetry is MN, the bisector of the vertical angle $\angle BAC$.
There is no point of symmetry.

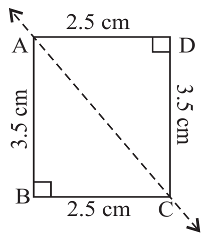


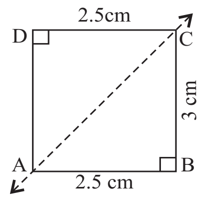
(c) The four line of symmetry are LM, NO, PQ and RS.
There is one point of symmetry E.

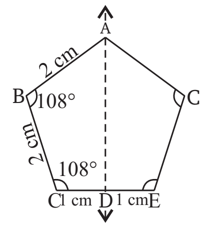


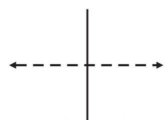
(d) The line of symmetry is PQ. There is no point of symmetry.



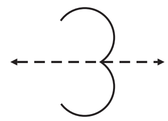
3. (a)


(b)


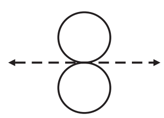
(c)


4. (a)


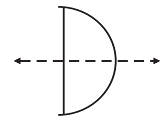
one line of symmetry

(b)


one line of symmetry

(c)


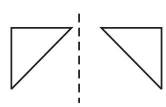
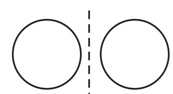
2 lines of symmetry

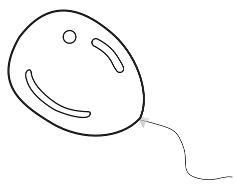
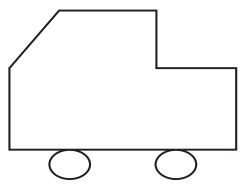
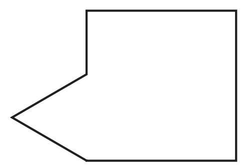
(d)


1 line of symmetry

5. (a)

(b)

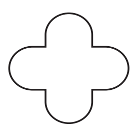
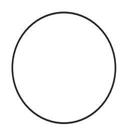
(c)

(d)


6. (a)

(b)

(c)


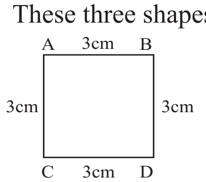
7. (a) Infinite
(b) 4 lines of symmetry
(c) 4 lines of symmetry
(d) *O* lines of symmetry

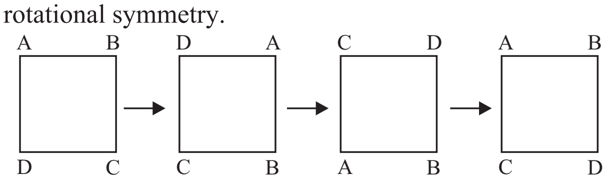
Exercise 14.2

1. (i)

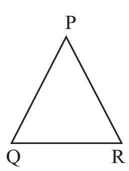
(v)

(vi)


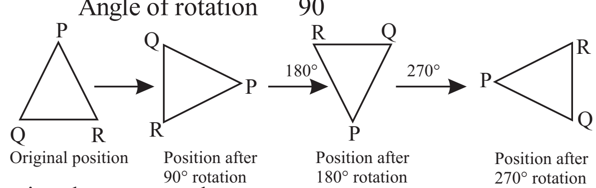
These three shapes show rotational symmetry.

2.




Order of rotational symmetry $= \frac{360}{\text{Angle of rotation}} = \frac{360}{90} = 4$

3.




Rotation with *P* as fixed point shown as under.

4. No.

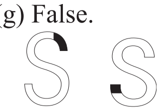
5. Order of rotation symmetry $= \dfrac{360°}{\text{Angle of rotation}} = \dfrac{360°}{72°} = 5$

Regular pentagon has rotational symmetry of order 5.

6. **State whether the following statements are True or False :**

(a) False (b) True (c) True (d) False (e) True (f) False (g) False.

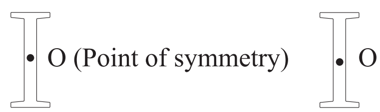
7. You could turn (rotate) the letter S around to its new position and you would not know it had changed (a blob has put on to show its position).



So, rotational order of length S is $\dfrac{360°}{2} = 2$

Note that letter S has point of symmetry also.

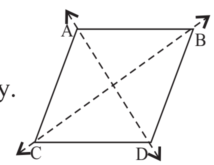
we can turn (rotate) the letter I around to its new position any we would not know. It had changed (a blob has put on to show its position).



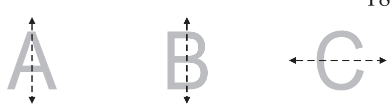
So, rotational order of letter I is $\dfrac{360°}{2} = 2$

Letter I has point of symmetry O.

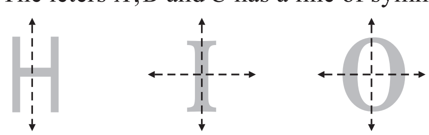
8. Parallelogram is a geometrical figure which has no line of symmetry.



Rotaional symmetry of order $= \dfrac{360}{180} = 2$

9. 

The leters A, B and C has a line of symmetry, but they have no rotational symmetry.

10. 

The letters H, I and O has lines of symmetry and the rotational symmetry.

MCQ's

1. (b) **2.** (c) **3.** (c) **4.** (c) **5.** (c) **6.** (a) **7.** (a) **8.** (a).

15. Area

Exercise 15.1

1.

S.No.	Length	Breadth	Area	Perimeter
(i)	19 cm	14 cm	266 cm^2	66 cm
(ii)	16.8 cm	7.2 cm	120.96 cm^2	48 cm
(iii)	52 m	38 m	1976 m^2	180 m
(iv)	65 mm	4 cm	26 cm^2	21 cm
(v)	26 m	17 m	442 cm^2	86 m

2. (a) Side = 4.8 cm

Area of square = $(\text{Side})^2$

$\therefore$ Area of square = $(4.8)^2$

$= 4.8 \times 4.8 = 23.04 \text{ cm}^2$

Perimeter = 4 × side = 4 × 4.8 = 19.2 cm

(b) Side = 35 m

Area of square = $(\text{side})^2$

$\therefore$ Area of square = $(35 \text{ m})^2 = 35 \times 35 \text{ m}^2 = 1225 \text{ m}^2$

Perimeter = 4 × side = 4 × 35 = 140 m

(c) Side = 44 mm

$\therefore$ Side = $\frac{44}{10}$ cm $\quad\left[\because 1\text{mm} = \frac{1}{10}\text{cm}\right]$

$\therefore$ Side= 4.4 cm

Area of square $= (\text{side})^2 = (4.4 \text{ cm})^2$

$= 4.4 \times 4.4 \text{ cm}^2$

$= 19.36 \text{ cm}^2 = 1936 \text{ mm}^2$

Perimeter = 4 × side = 4 × 4.4 = 17.6 cm = 176 mm

(d) Side = 2 m 50 cm = 2 m + 50 cm

$= 2\text{m} + \frac{50}{100}\text{m}$ $\quad[\because 1\text{cm} = 1\text{m} = 100]$

$= 2\text{m} + \frac{1}{2}\text{m} = 2.5 \text{ m}$

Area of square $= (\text{side})^2$

$= (2.5)^2 = 2.5 \times 2.5$

$\therefore$ Area of square = 6.25 m^2

Perimeter = 4 × side = 4 × 2.5 = 10 m

3. Given, Area of rectangle = 24 cm^2

width = 6 cm

In rectangle, $l = \frac{\text{Area}}{\text{width}} = \frac{24}{6} = 4 \text{ cm}$

4. Let the length and breadth be l and b respectively.

Then Area = $l \times b$

Now, length and breadth become double.

$\therefore$ $l_2 = 2l$ and $b_2 = 2b$

Now, the area of rectangle = length × breadth

$= 2l \times 2b = 4lb$

= 4 × (Area of previous rectangle)

Hence, double both the sides of a rectangle, the new Area will become four times the previous rectangle.

5. Given, length of a rectangular field = 180 m

Breadth of a rectangular field = 650 m

$\therefore$ Area $= l \times b = 180\text{m} \times 650 \text{ m}$

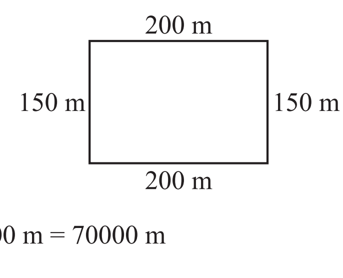
$= 117000 \text{m}^2$ $\quad[1\text{hectare} = 10{,}000\text{m}^2]$

$= \frac{117000}{10}\text{m}^2$

$= 11.7 \times 10000 \text{ m}^2 = 11.7$ hectares

6. Length of a playground = 200 m

breadth of a playground = 150 m



Now, distance covered by the Athlete in 1 round

= Perimeter of the playground

$= 2(l + b) = 2(200 + 150)$

$= 2 \times 350 = 700\text{m}$

$\therefore$ Total distance covered by the Athlete = 7 km

$= 7 \times 1000 \text{ m} = 70000 \text{ m}$

$\therefore$ required time to go around this field $= \dfrac{7000}{700} = 10$ times

Hence, the Athlete should go 10 times around this field.

7. Length of the floor = 16 m,

Breadth of the floor = 12 m

$\therefore$ Area of the rectangular floor $= l \times b = 16 \text{ cm} \times 12 \text{ m} = 192 \text{ m}^2$

$\because$ The cost of carpetting the rectangular floor of 1 m^2 = ₹ 225

$\therefore$ The cost of carpetting the rectangular floor of 192 m^2 = ₹ (225 × 192) = ₹ 43200

8. Area of greeting cards $= l \times b = 10 \text{ cm} \times 66 \text{ m} = 60 \text{ cm}^2$

Area of a sheet of paper $= l \times b = 1 \times 0.96 = 0.96 \text{ m}^2$

$= 0.96 \times 100 \times 100 \text{ cm}^2$ $\quad [\because 1\text{m}^2 = 100 \times 100\text{cm}]$

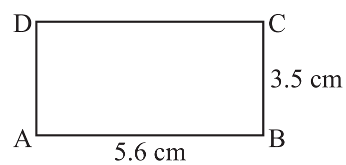
$= \dfrac{96}{100} \times 100 \times 100 \text{ cm}^2 = 9600 \text{ cm}^2$

no. of greeting cards $= \dfrac{\text{Area of a sheet of paper}}{\text{Area of greeting cards}}$

$= \dfrac{9600\text{cm}^2}{60\text{cm}^2} = 160$

9. length of 60 cm = 5.6 m

breadth of room = 3.6 m



$\therefore$ Area of room $= l \times b = 5.6 \times 3.6 \text{m}^2 = 20.16 \text{ m}^2$

Area of one square marble = side × side

$= 10 \times 10 = 100 \text{ cm}^2$

$= \dfrac{100}{100 \times 100} \text{m}^2$ $\quad [\because 1\text{m} = 100\text{cm}]$

$= \dfrac{1}{100} \text{m}^2 = 0.01 \text{ m}^2$ $\quad \left[1\text{cm}^2 = \dfrac{1}{100 \times 100} \text{m}^2\right]$

$\therefore$ required number of tiles to b laid in the room

$= \dfrac{\text{Area of the room}}{\text{Area of one square marble}}$

$= \dfrac{20.16\text{m}^2}{0.01\text{m}^2} = \dfrac{20.16}{0.01} = \dfrac{2016}{1} = 2016$

$\because$ Cost of laying 2 files = ₹ 5

$\therefore$ Cost of laying 2 tile = ₹ $\dfrac{5}{2}$

and cost of laying 2016 files = ₹ $\dfrac{5}{2} \times 2016$

= ₹ 5 × 1008 = ₹ 5040

10. Length $(l) = 2.6$ m,

breadth $(b) = 1.1$ m

Area of the door $= l \times b = 2.6 \text{ m} \times 1.1 \text{ m}$

$= 2.86 \text{ m}^2$

$\because$ cost of painting 1 m^2 the area of door = ₹ 20

$\therefore$ cost of painting 2.86 m^2 area of the door on both sides = ₹ 20 × (2 × 2.86)
= ₹ 114.40

11. length $(l) = 400\,m$, breadth $(b) = 225\,m$
Area of farmer's rectangular plot $= l \times b$
$= 400\,m \times 225\,m = 90{,}000\,m^2$
We know that, 1 hectare = 10,000 m^2
Let he should buy $x\,m^2$ more area of the land.
then, we have $x + 90{,}000 = 10$ hectare

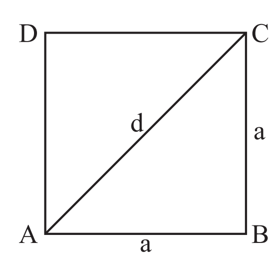
$$x + 90{,}000 = 10 \times 10{,}000\,m^2$$
$$x + 90{,}000 = 100000$$
$$x = 100000 - 90000$$
$$x = 10{,}000\,m^2$$

Hence, he should buy 10,000 m^2 more Area of land to make the area of his field equal to be hectare.

12. Area of the square plot = 400 m × 400 m = 160000 m^2
he keeps the area of the square plot with him = 9 hectares
$= 9 \times 10{,}000\,m^2$ [$\because$ 1 hectare $= 10{,}000\,m^2$]
$= 90{,}000\,m^2$
$\therefore$ remaining sold plot $= (160000 - 90000)\,m^2 = 70{,}000\,m^2$
Now, since cost of selling the remaining plot of 1 m^2 = ₹ 900
$\therefore$ cost of selling the remaining plot of 70,000 m^2 = ₹ 900 × 70,000
= ₹ 63,000,000
= ₹ 6 crore 30 lakh.

13. The area of four walls of a room = 144 m^2
Let breadth of the room $= x$ m
Then length of the room $= (3x)$
and height of the room = 3 m
Area of 4 walls $= 2 \times (l + b) \times h$
$\Rightarrow \quad 2 \times (3x + x) \times 3 = 144$
$\Rightarrow \quad 6 \times 4x = 144$
$\Rightarrow \quad x = \dfrac{144}{24} = 6$
$\therefore$ breadth $(b) = x = 6\,m$
length $(l) = 3 \times x = 3 \times 6 = 18\,m$
Now, Area of the floor $= l \times b = 18 \times 6 = 108\,m^2$

14. Given, Area of the square = 18050 m^2
but area of the square = $(\text{side})^2$
$\Rightarrow \quad 18050 = a^2 \quad \ldots(1)$
Now, length of the diagonal $(d) = \sqrt{a^2 + a^2} = \sqrt{2a^2}$
$\therefore \quad d = \sqrt{2 \times 18050}$ [by equation (1)]
$= \sqrt{36100\,m^2}$
$= 190\,m$



15. Length $(l) = 9.5$ m, breadth $(b) = 7.5$ m, height = 2.5 m

∴ Area of 4 walls of the room $= 2(l + b) \times h$

$= 2 \times (9.5 + 7.5) \times 2.5 \quad = 85\,\text{m}^2$ …(1)

Area of 1 door $= 2\,\text{m} \times 3\text{ m} = 6\,\text{m}^2$ …(2)

Area of 2 windows $= 2 \times (l \times b)\ \ 2 \times (3.5 \times 2) = 14\text{ m}^2$ …(3)

Total area of 1 door and 2 windows $= 6 + 14 = 20\,\text{m}^2$ …(4)

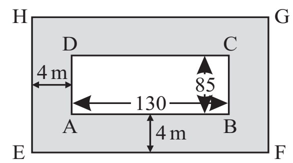
∴ Area to be painting $= 85 - 20 = 65\,\text{m}^2$

∵ cost of painting 1 m^2 Area = ₹ 5.60

∴ cost of painting 65 m^2 area = ₹ (65×5.60) = ₹ 364

Hence, the total cost of painting the 4 walls = ₹ 364

Exercise 15.2



1. Let *ABCD* is the field and shaded portion is the path

Then, $EF = 130 + 4 + 4 = 138\,\text{m}$

$FG = 85 + 4 + 4 = 93\,\text{m}$

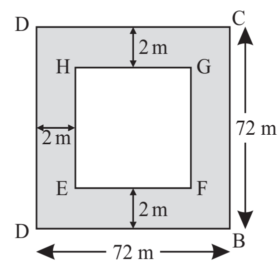
Area of the field $= (l \times b)\,\text{m}^2$

$ABCD = (130 \times 85)\,\text{m}^2 = 11050\text{ m}^2$

Area of $EFGH = (l \times b)\,\text{m}^2 \;= 138 \times 93 = 12834\text{ m}^2$

∴ Area of the path = Area of *EFGH* – Area of *ABCD*

$= 12834 - 11050 = 1784\text{ m}^2$



2. Let *ABCD* be a square field.

Whose sides $AB = BC = CD = DA = 72\,\text{cm}$

Area of square fieild $ABCD = (\text{side})^2 = (72)^2$

$= 72 \times 72 = 5184\text{ m}^2$

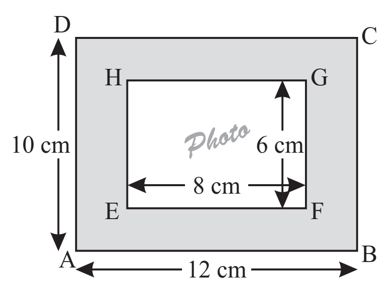
length of the square $EFGH = 72 - 2 = 2 = 68$

breadth of the square $EFGH = 72 - 2 - 2 = 68\,\text{m}$

∴ Area of square $EFGH = (\text{side})^2 = (68)^2 = 68 \times 68 = 624\text{ m}^2$

∴ Area of the path = Area of square field *ABCD* – Area ofsquare field *EFGH*

$= (5184 - 4624)\,\text{m}^2 = 560\,\text{m}^2$



3. Let *ABCD* be a cardboard

Area of the cardboard $= l \times b \;= 12\text{ cm} \times 10\text{ cm}$

$= 120\text{ cm}^2$

again, let *EFGH* be the photo which is placed in the middle of the cardboard.

∴ length of the photo = 8 cm

breadth of the photo = 6 cm

∴ Area of the mounted photo on a cardboard

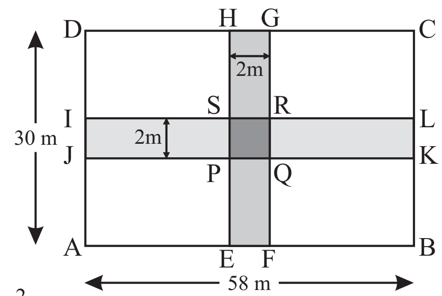
$= l \times b = 8 \times 6 = 48\,\text{cm}^2$

Now, area of cardboard that is visible outside the photo

= Area of the cardboard *ABCD* – Area of the mounted photo on a cardboard

$= (120 - 48)\,\text{cm}^2 = 72\,\text{cm}^2$

4. Let *ABCD* represent the field and *EFGH* and *IJKL* represent the two cross roads.
length of the field $(l) = 58\,\text{m}$
breadth of the field $(b) = 30\,\text{m}$



$\therefore$ Area of the field $= l \times b$
$= 58 \times 30 = 1740\,\text{m}^2$

Area of the road *IJKL* $= l \times b$
$= 15 \times 2 = 116\ \text{m}^2$

Area of the road *EFGH* $= l \times b = 30 \times 2 = 60\,\text{m}^2$

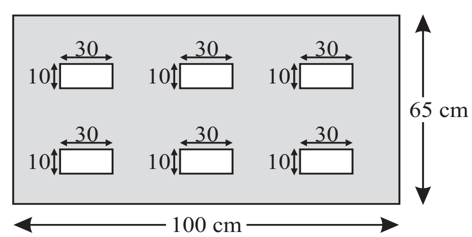
Area of the square *PQRS* = $(\text{side})^2 = (2)^2 = 4\ \text{m}^2$

Area of square *PQRS* occurs in both these roads.

In order to get the area of the roads, we subtract the area of *PQRS* once from their sum, i.e.,

$\therefore$ Area of the roads $= 116 + 60 - 4 = 172\,\text{m}^2$

5. Let *ABCD* be a retangular park in while length $(l) = 100\,\text{m}$, breathe $(b) = 65\,\text{m}$



Area of the rectangular park *ABCD*
$= l \times b = 100 \times 65 = 6500\,\text{m}^2$

Area of 1 flower bed
$= l \times b = 20 \times 10 = 200\,\text{m}^2$

$\because$ Area of such 6 flower beds
$= 6 \times 200 = 1200\,\text{m}^2$

$\therefore$ Area of the path remaining portion of the park
= Area of *ABCD* – Area of 6 flower beds
$= (6500 - 1200)\,\text{m}^2 = 5300\ \text{m}^2$

$\because$ Cost of laying the path in the remaining portion of the park 1 m^2 area = ₹ 20

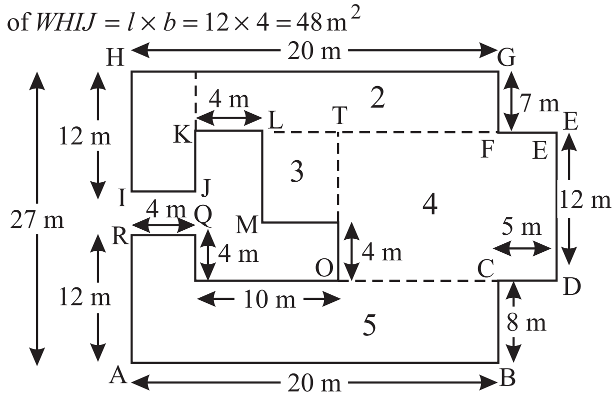
$\therefore$ cost of laying the path in the remaining portion of the park of 5300 m^2 area
= ₹ (20 × 5300) = ₹ 106000 = ₹ 1 lakh 6 thousand

6. (i) Area of *ABCS* $= l \times b = 20 \times 8 = 160\ \text{m}^2$ …(1)

Area of *DETO* $= l \times b = (6 + 5) \times 12 = 11 \times 12 = 132\,\text{m}^2$ …(2)

Area of *FGK* $= l \times b = (10 + 6) \times 7 = 16 \times 7 = 132\,\text{m}^2$ …(3)

Area of *WHIJ* $= l \times b = 12 \times 4 = 48\,\text{m}^2$ …(4)



Area of $LMNT = l \times b = TN \times MN = 8 \times 6 = 48\,\text{m}^2$ …(5)

Area of $PQRS = l \times b = SP \times PQ = 4 \times 4 = 16\,\text{m}^2$ …(6)

Adding all the equation (1) to (6), we get

$\therefore$ Area of the required Fig. (i)

$= \text{Area of }(WHIJ) + \text{Area of }(FGWK) + \text{Area of }(LMNT)$
$+ \text{Area of }(DETO) + \text{Area of }(ABCS) + \text{Area of }(PQRS)$

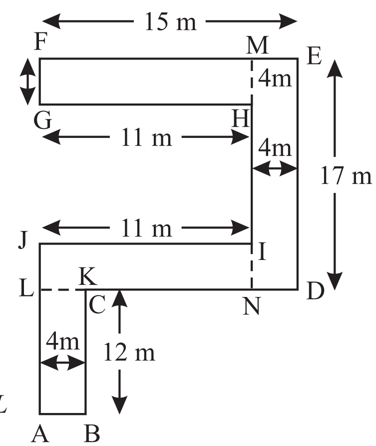
$= (48 + 112 + 48 + 132 + 160 + 16)\,\text{m}^2 = 516\,\text{m}^2$

(ii) Area of $DEMN = l \times b = 17 \times 4$
$= 68\,\text{m}^2$ …(1)

Area of $MFGH = l \times b = 11 \times 4$
$= 44\,\text{m}^2$ …(2)

Area of $IJLN = l \times b = 11 \times 4$
$= 44\,\text{m}^2$ …(3)

Area of $ABKL = l \times b = 12 \times 4$
$= 48\,\text{m}^2$ …(4)



Adding all the equations (1) to (4), we get

Area of the required Fig. (ii)

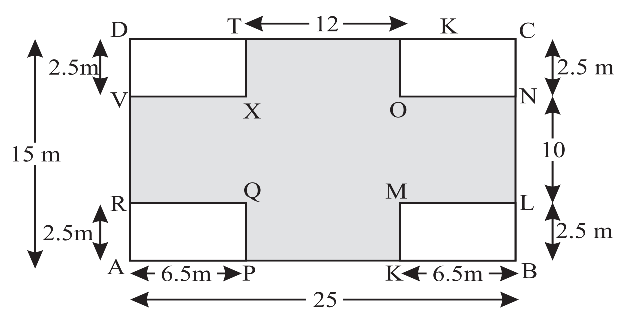
$= \text{Area of } DEMN + \text{Area of } MFGH$
$+ \text{Area of } IJLN + \text{Area of } ABKL$

$= (68 + 44 + 44 + 48)\,\text{m}^2 = 204\,\text{m}^2$

7. (i) Let $AB = DC = 25\,\text{m}$, $AD = BC = 15\,\text{m}$

Area of $ABCD = l \times b = 25 \times 25 = 375\,\text{m}^2$

From the fig. it is clear that $AP = RQ = 6.5$ m, $KB = ML = 6.5$ m



Similarly, $ON = KC = 6.5$ and $VX = DT = 6.5$ m

$AR = PQ = 2.5$ m, $KM = BL = 2.5$ m

and $NC = OK = 2.5$ m, $DV = TX = 2.5$ m

Now, area of one corner $= l \times b = 6.5 \times 2.5 = 16.25\,\text{m}^2$

Area of 4 corner $= 4 \times (l \times b) = 4 \times 16.25 = 65\,\text{m}^2$

$\therefore$ Area of the shaded portion $= \text{Area of } ABCD - \text{Area of 4 corners}$
$= 375 - 65 = 310\,\text{m}^2$

(ii) Given $AB = DC = 25\,\text{m}$, $AD = BC = 15\,\text{m}$, $AN = AB - (NM + MB)$
$= 25 - (13 + 6)$

$\therefore$ $AN = 25 - 19 = 6\,\text{m}$

$\Rightarrow \quad AN = FG = EH = DI = 6\,\text{m}$

$CP = JK = IH = DE = 3.5\text{ m}$

$FA = AD - (DE + EF) = 15 - (3.5 + 8)$

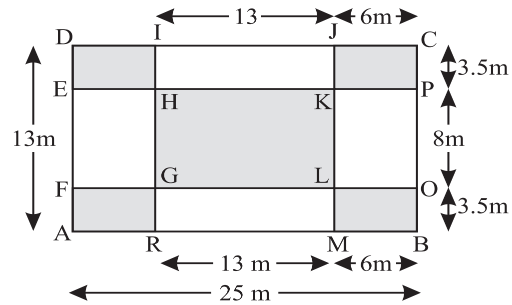
$= 15 - 11.5 = 3.5\,\text{m}$

Area of whole $ABCD$ part $= l \times b = 25 \times 15 = 375\text{ m}^2$ ...(1)

Area of 1 corner part $= l \times b = 6 \times 3.5 = 21.0\,\text{m}^2$

$\therefore$ Area of 4 corner part $= 4 \times 21 = 84\text{ m}^2$ ...(2)

Area of inner part $GLKH = l \times b = 13 \times 8 = 104$ ...(3)



Now, area of shaded parts = Area of 4 corners + Area of inner part $GLKH$

$= 84 + 104 = 188\,\text{m}^2$

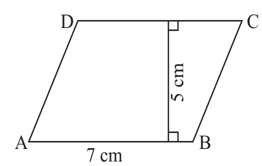
Exercise 15.3

1. (i) Area of the parallelogram

$= \text{Base} \times \text{altitude}$

$= AB \times h_1$

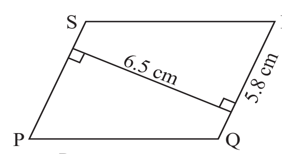
$= 7\,\text{cm} \times 5\text{ cm} = 35\,\text{cm}^2$



(ii) Area of the parallelogram $= b \times h$

$= 5.8 \times 6.5$

$= 37.7\text{ cm}^2$

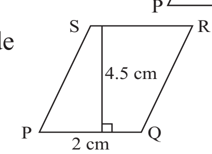


(iii) Area of the parallelogram

$= \text{Base} \times \text{altitude}$

$= 2 \times 4.5$

$= 9\text{ cm}^2$

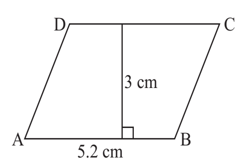


(iv) Area of the parallelogram

$= \text{Base} \times \text{Altitude}$

$= 5.2 \times 3$

$= 15.6\,\text{cm}^2$



2. (a) Given : base = 5.6 cm, height = 4.2 cm

$\therefore$ Area $= \text{base} \times \text{height}$

$= 5.6 \times 4.2 = 23.52\text{ cm}^2$

(b) Given : base = 6.4 cm, height = 3.6 cm

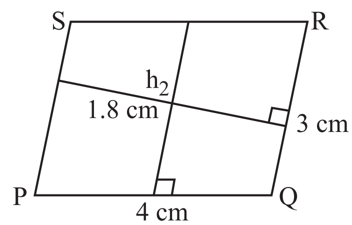
In Area $= \text{base} \times \text{height}$

$= 6.4 \times 3.6 = 23.04\text{ cm}^2$

3. Given : Area of paralelogram = 6.25 m^2
altitude (height) = 5.0 m
base = ?

$$\text{Area} = \text{base} \times \text{altitude}$$
$$6.25 = \text{base} \times 5.0$$
$$\therefore \quad \text{base} = \frac{6.25}{5.0} = 1.25 \text{ m}$$

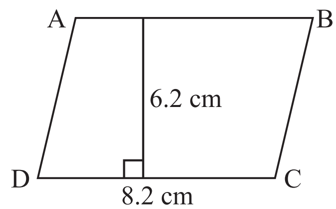
4. Let $PQRS$ be the parallelogram whose side are $PQ = 4$ cm, $QR = 3$ cm



Area of parallelogram = Base × Altitude

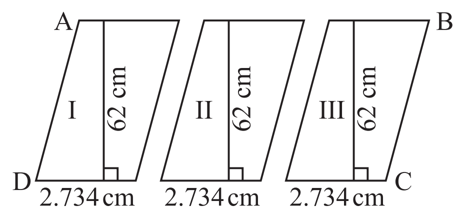
$\therefore \quad 4 \times 1.8 = 3 \times h_2$
$\Rightarrow \quad 7.2 = 3 \times h$
or $\quad 3h = 7.2$
$\Rightarrow \quad h = \frac{7.2}{3} = 2.4$ cm

5. Side of parallelogram = 8.2
Altitude = 6.2



Area of parallelogram = base × altitude
= 8.2 × 6.2
= 50.84 sq. cm.

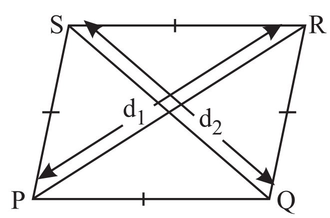
It is divided in 3 equal parts.
Then, Length of base = 8.2 ÷ 3
= 2.734 cm (a rox)
altitude = 6.2 cm



So, area of each parallelogram
= base × altitude
= (2.734×6.2) sq. cm.
= 16.950 sq. cm.

6. Let $ABCD$ is the rhombus whose diagonals are $d_1 = 8$ cm mm and $d_2 = 6$ cm 5 mm

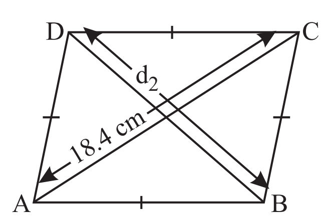
Now, $\quad d_1 = 8$ cm 8 mm = 8 cm + 8 mm
$= 8 \text{ cm} + \frac{8}{10} \text{ mm}$
= 8 cm + 0.8 cm $\quad$ [$\because$ 1cm = 0mm]
= 8.8 cm



and $\quad d_2 = 6$ cm 5 mm = 6 cm + 5 mm
$= 6 \text{ cm} + \frac{5}{10} \text{ cm}$
= 6 cm + 0.5 cm = 6.5 cm

Area of rhombus $= \frac{1}{2} \times d_1 \times d_2$
$= \frac{1}{2} \times 8.8 \times 6.5 = 4.4 \times 6.5 = 28.6 \text{ cm}^2$
= 28.6 × 100 mm = 2860 mm

7. Area of rhombus = 202.4 cm^2
one diagonal $(d_1) = 18.4$ cm
other diagonal $(d_2) = ?$



$$\text{Area of rhombus} = \frac{1}{2} \times d_1 \times d_2$$

$$\Rightarrow \quad 202.4 = \frac{1}{2} \times 18.4 \times d_2$$

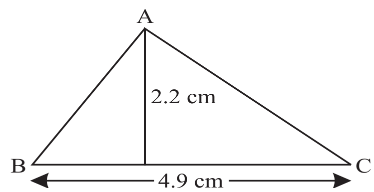
$$\Rightarrow \quad 202.4 = 9.2 \times d_2$$

$$\Rightarrow \quad d_2 = \frac{202.4}{9.2} = 22$$

Hence, other diagonal $(d_2) = 22\,\text{cm}$.

Exercise 15.4

1. (i) Area of the triangle *ABC*

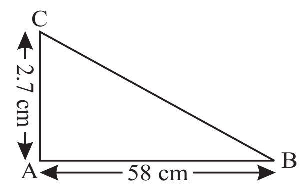


$$= \frac{1}{2} \times \text{Base} \times \text{Altitude}$$

$$= \frac{1}{2} \times 4.9 \times 2.2$$

$$= 4.9 \times 1.1 = 5.39\,\text{cm}^2$$

(ii) Area of ΔPQR



$$= \frac{1}{2} \times \text{Base} \times \text{Altitude}$$

$$= \frac{1}{2} \times 5.8 \times 2.7$$

$$= 2.9 \times 2.7 = 7.83\,\text{cm}^2$$

2. (a) given, Area = 4.83 cm^2, altitude = 2.3 cm, base = ?

$$\text{Area} = \frac{1}{2} \times \text{base} \times \text{altitude}$$

$$\Rightarrow \quad 4.83 = \frac{1}{2} \times \text{base } 2.3$$

$$\Rightarrow \quad \text{base} = \frac{4.83 \times 2}{2.3} \quad \Rightarrow \quad \text{base} = \frac{9.66}{2.3} = 4.2\,\text{cm}.$$

(b) Area = 9.38 m^2, altitude = 2.8 m, base = ?

$$\text{Area} = \frac{1}{2} \times \text{base} \times \text{altitude}$$

$$\Rightarrow \quad 9.38 = \frac{1}{2} \times \text{base} \times 2.8$$

$$\Rightarrow \quad \text{base} = \frac{2 \times \overset{3.35}{9.38}}{2.8} = 2 \times 3.35 = 6.7\,\text{m}.$$

(c) Area = 11.4 cm^2, altitude = 4 cm, base = ?

$$\text{Area} = \frac{1}{2} \times \text{base} \times \text{altitude}$$

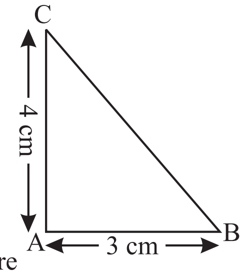
$$\Rightarrow \quad 11.4 = \frac{1}{2} \times \text{base} \times 4 \quad \Rightarrow \quad 11.4 = \text{base} \times 2$$

$$\Rightarrow \quad \text{base} = \frac{11.4}{2} = 5.7\,\text{cm}.$$

3. Area of right triangle = 6 cm^2, base = 3 cm

but, $\quad \text{Area} = \frac{1}{2} \times \text{base} \times \text{height}$

$$6 = \frac{1}{2} \times 3 \times h \qquad \Rightarrow \qquad h = \frac{6 \times 2}{3} = 4 \text{ cm.}$$



Let ABC is the right triangle.

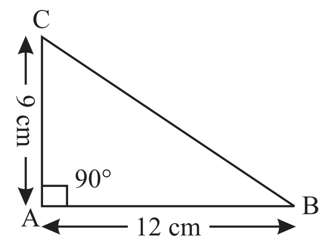
Then by Pythagoras theorem, we have.

$$BC^2 = AC^2 + AB^2$$

$$= 4^2 + 3^2 = 16 + 9 = 25 \quad BC = \sqrt{25} = 5 \text{ cm.}$$

Hence, the other two sides are 4 cm and 5 cm.

4. Let ABC be field in the form of a right triangle whose sides are $AB = 120\,\text{m}$, $AC = 90\,\text{cm}$



$\therefore$ Area of triangular field $= \frac{1}{2} \times \text{base} \times \text{height}$

$$= \frac{1}{2} \times 120 \times 90$$

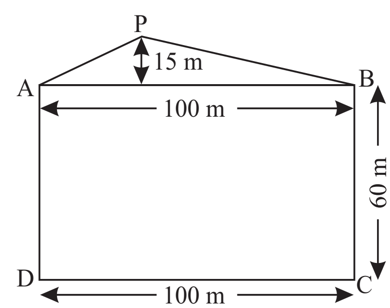
$$= 60 \times 90 = 5400\,\text{m}^2$$

$\therefore$ cost of levelling the 1m^2 field = ₹ 12

$\therefore$ cost of levelling the 5400 m^2 = ₹ 12×5400

= ₹ 64800.

5. Let $PADCBP$ is the wall



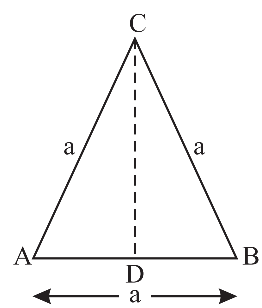
$\therefore$ Area of the wall = Area of rectangle $ABCD$ + Area of triangle ABP

$$= (l \times b) + \frac{1}{2} \times b \times h$$

$$= (100 \times 60) + \frac{1}{2} \times (100 \times 15)$$

$$= 6000 + 50 \times 15 \qquad = 6750 \text{ m}^2$$

6. Area of equilateral $\Delta = \frac{\sqrt{3}}{4} a^2$



$$\Rightarrow \qquad \frac{\sqrt{3}}{4} a^2 = 9\sqrt{3}$$

$$\Rightarrow \qquad a^2 = 9 \times 4 = 36 \quad \Rightarrow \quad a = \sqrt{36} = 6\,\text{cm}$$

$$\text{altitude} = \frac{\sqrt{3}}{2} a$$

$$= \frac{\sqrt{3}}{2} \times 6 \therefore \qquad \text{altitude} = 3\sqrt{3} \text{ cm.}$$

7. Let $a = 17\,\text{cm}$, $b = 10\,\text{cm}$, $c = 9\,\text{cm}$

$$2S = a + b + c = 17 + 10 + 9 = 36$$

$$S = \frac{36}{2} = 18\,\text{cm}$$

$\therefore$ by Heron's formula, we know that

Area of the triangle $= \sqrt{S\,.(S-a)(S-b)(S-c)}$

$$= \sqrt{18 \times (18-17)(18-10)(18-9)}$$

$$= \sqrt{18 \times 1 \times 8 \times 9} = \sqrt{2 \times 9 \times 8 \times 9}$$

$$= \sqrt{16 \times 81} = \sqrt{4 \times 4 \times 9 \times 9}$$

$$= 4 \times 9 = 36\,\text{cm}^2$$

8. Let $a = 40\text{m}$, $b = 37\,\text{m}$, $c = 13\,\text{m}$

$$S = \frac{a+b+c}{2} = \frac{40+37+13}{2} = \frac{90}{2} = 45\,\text{m}$$

$\therefore$ by Heron's formula, we know that

Area of the triangle $= \sqrt{S\,(S-a)\,(S-b)\,(S-c)}$

$= \sqrt{45 \times (45-40) \times (45-37) \times (45-13)}$

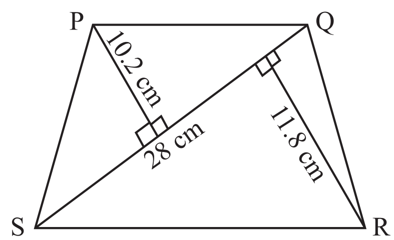
$= \sqrt{45 \times 5 \times 8 \times 32} = \sqrt{225 \times 256}$

$= \sqrt{15 \times 15 \times 16 \times 16} = 15 \times 16 = 240\ \text{m}^2$

9. Let $PQRS$ be the given quadrilateral.

QS is the given diagonal and $PM \perp QS$, $RN \perp SQ$.

$SQ = 28\,\text{cm}$, $PM = 10.2$ cm, $RN = 11.8$ cm.



Area of quadrilateral $PQRS$

$= \text{Area of } \Delta\, PSQ + \text{Area of } \Delta\, RSQ$

$= \frac{1}{2} \times SQ \times PM + \frac{1}{2} \times SQ \times RN$

$= \frac{1}{2} \times SQ \times (PM + RN)$

$= \frac{1}{2} \times 28 \times (10.2 + 11.2) = 14 \times 22 = 308\ \text{cm}^2$

Hence, the area of the quadrilateral $PQRS$ is $308\ \text{cm}^2$.

10. Given, perimeter of triangle = 24 cm

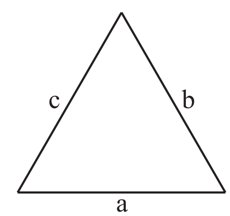
Sides = 3 : 4 : 5,

Let $a = 3x, b = 4x, c = 5x$

then P = sum of all the sides $= a + b + c$

$\Rightarrow \quad 24 = 3x + 4x + 5x$

$\Rightarrow \quad 24 = 12x \quad \Rightarrow \quad \frac{24}{12} = x \quad \Rightarrow \quad x = 2$



Hence, $a = 3x = 3 \times 2 = 6\,\text{cm}$,

$b = 4x = 4 \times 2 = 8\,\text{cm}$,

$c = 5x = 5 \times 2 = 10\,\text{cm}$.

Now, $2S = a + b + c = 6 + 8 + 10 = 24$

$S = \frac{24}{2} = 12$

$\therefore$ by Heron's formula, we know that

Area of $\Delta = \sqrt{S\,(S-a)(S-b)(S-c)}$

$= \sqrt{12 \times (12-6) \times (12-8) \times (12-10)}$

$= \sqrt{12 \times 6 \times 4 \times 2} = \sqrt{12 \times 12 \times 4} = 12 \times 2 = 24\ \text{cm}^2$.

Exercise 15.5

1. (a) $d = 21\,\text{cm}, r = \frac{d}{2} = \frac{21}{2}\,\text{cm}$

$$c = 2\pi r = 2 \times \frac{22}{7} \times \frac{\overset{3}{21}}{2} = 66\,\text{cm}$$

(b) $d = 5.6$ cm, $r = \frac{5.6}{2} = 2.8$ cm

$$c = 2\pi r = 2 \times \frac{22}{7} \times 2.8 = 17.6 \text{ cm}$$

(c) $d = 2.5$ m, $r = \frac{d}{2} = \frac{2.5}{2}$ m

$$c = 2\pi r = 2 \times \frac{22}{7} \times \frac{2.5}{2} = \frac{55}{7} = 7\frac{6}{7} \quad \text{or } 7.85 \text{ m}$$

2. Given, $C = 26.4$ m but

$$C = 2\pi r$$

$\Rightarrow$ $2\pi r = 26.4$ $r = \frac{26.4 \times 7}{2 \times 22} = 4.2$ m

$\therefore$ $d = 2r = 2 \times 4.2 = 8.4$ m.

3. Given, $d = 5.6$ m, $r = \frac{d}{2} = \frac{5.6}{2} = 2.8$ m

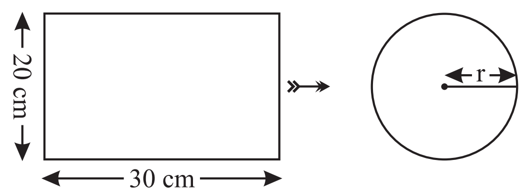
$$C = 2\pi r = 2 \times \frac{22}{7} \times 2.8 = 17.6 \text{ m}^2$$

4. Perimeter of rectangle $= 2(l + b)$

$= 2(35 + 20)$

$= 2 \times 55$

$= 110$ cm



Circumference of circular ring

= Perimeter of rectangle

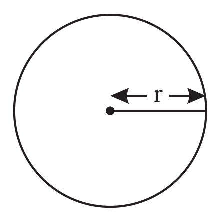
$\Rightarrow$ $2\pi r = 110$

$\Rightarrow$ $2 \times \frac{22}{7} \times r = 110$

$\Rightarrow$ $r = \frac{7 \times 110}{44} = 17.5$ cm

$\therefore$ $d = 2r = 2 \times 17.5 = 35$ cm.

5. Given, $d = 700$ m



$\therefore$ $r = \frac{d}{2} = \frac{700}{2} = 350$ m

Since distance travelled in a round by a man

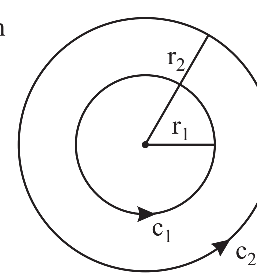
= circumference of the circular park

$= 2\pi r = 2 \times \frac{22}{7} \times 350 = 2200$ m.

$\therefore$ distance travelled in 5 rounds (i.e. times) daily by a man

$= 5 \times (2200 \text{ m}) = 11000 \text{ m} = 11$ km.

6. Given, $r_1 = 77$ cm, $r_2 = 91$ cm



$C_1 = 2\pi r_1 = 2 \times \frac{22}{7} \times 77$

$= 44 \times 11 = 484$ cm

$C_2 = 2\pi r_2 = 2\frac{22}{7} \times 91 = 44 \times 13 = 572$ cm.

$\therefore$ difference $= C_2 - C_1 = 572 - 484 = 88$ cm

$\therefore$ The circumference of second circle is 88 cm longer than the first.

7. $C_1 = 2\pi r,$

$\Rightarrow \quad 2\pi r_1 = 154 \quad \Rightarrow \quad 2 \times \frac{22}{7} \times r_1 = 154$

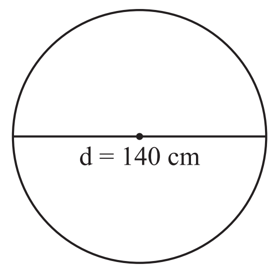
$\Rightarrow \quad r_1 = \frac{154 \times 7}{2 \times 22} = \frac{49}{2} = 24.5$ cm.

$C_2 = 2\pi r_2$

$\Rightarrow \quad 2 \times \frac{22}{7} \times r^2 = 121 \quad \Rightarrow \quad r_2 = \frac{121 \times 7}{2 \times 22} = \frac{847}{44} = 19.25$

$\therefore$ required difference $= C_1 - C_2 = 24.5 - 19.25 = 5.25$ cm.

8. Given, diameter of the wheel ofa card = 140 cm



$\therefore \quad r = \frac{d}{2} = \frac{140}{2} = 70$ cm.

distance covered by the cart in 1complete revolution

= circumference of the wheel

$= 2\pi r$

$= 2 \times \frac{22}{7} \times 70 = 44 \times 10 = 440$ cm

$\therefore$ distance covered by the cart in 40 complete revolutions

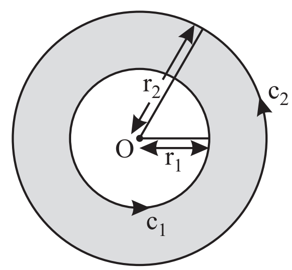
$= 40 \times 440 = 17600 = 176$ m.

9. Given, $r_1 : r_2 = 4 : 5$

$\therefore \quad C_1 = C_2 = 2\pi r_1 : 2\pi r_2$

$= \frac{2\pi r_1}{2\pi r_2} = \frac{r_1}{r_2} = \frac{4}{5} = 4 : 5$

10. Given, $C_1 = 200$ m



$\Rightarrow \quad 2\pi r_1 = 200$

$\Rightarrow \quad 2 \times \frac{22}{7} \times r_1 = 200$

$r_1 = \frac{200 \times 7}{2 \times 22} = \frac{700}{22}$ m $\quad \ldots(1)$

again, $C_2 = 220$ m

$\Rightarrow \quad 2 \times \frac{22}{7} \times r_2 = 220$

$\Rightarrow \quad r_2 = \frac{220 \times 7}{2 \times 22} = 35$ m $\quad \ldots(2)$

$\therefore$ width of the track $= r_1 - r_1$

$= 35 - \frac{700}{22} = \frac{770 - 700}{22} = \frac{70}{22} = 3.18$ or $3\frac{4}{22}$ m.

Exercise 15.6

1. (a) Given, $r = 2.1$

$\therefore \quad$ Area $(A) = \pi r^2 = \frac{22}{7} \times (2.1)^2 = \frac{22}{7} \times 2.1 \times 2.1 = 13.86$ m^2

(b) Given, $r = 14$ cm

$\therefore \quad$ Area $(A) = \pi r_2 = \frac{22}{7} \times (14)^2$

$= \frac{22}{7} \times 14 \times 14 = 616$ cm^2

2. (a) Given, $d = 7$ m

$\therefore \quad r = \frac{d}{2} = \frac{7}{2}$ m

$$A = \pi r^2 = \frac{22}{7} \times \left(\frac{7}{2}\right)^2$$

$$= \frac{22}{7} \times \frac{7 \times 7}{2 \times 2} = \frac{154}{4} = 38.5 \text{ m}^2$$

(b) $d = 12.6$ cm

$$r = \frac{d}{2} = \frac{12.6}{2} = 6.3$$

$$A = \pi r^2 = \frac{22}{7} \times (6.3)^2$$

$$= \frac{22}{7} \times 6.3 \times 6.3 = 124.74 \text{ cm}^2$$

3. (a) Given, Area $(A) = 616 \text{m}^2$

$$A = \pi r^2 = \frac{22}{7} r^2 \qquad \Rightarrow \qquad r = \sqrt{\frac{7 \times A}{22}}$$

$$\Rightarrow \qquad r = \sqrt{\frac{7 \times 616}{22}} = \sqrt{7 \times 28} \qquad \Rightarrow \qquad r = \sqrt{196} = 14 \text{ m.}$$

(b) $A = 2\pi \text{ cm}^3$

$$r = \sqrt{\frac{A}{\pi}} = \sqrt{\frac{2\pi}{\pi}} = \sqrt{2} = 1.414 \text{ cm.}$$

4. (a) $A = 50.24\ 24 \text{ m}^2$

$$r = \sqrt{\frac{A}{\pi}} = \sqrt{\frac{50.24}{3.14}} \qquad [\because \pi = 3.14]$$

$$= \sqrt{16} = 4$$

$\therefore \qquad d = 2r = 2 \times 4 = 8 \text{ cm}$

(b) $A = 314 \text{ m}^2$

$$r = \sqrt{\frac{A}{\pi}} = \sqrt{\frac{314}{3.14}} \qquad [\because \pi = 3.14]$$

$$= \sqrt{\frac{314 \times 100}{314}} \text{ m} = \sqrt{100} = 10 \text{ m}$$

$\therefore \quad d = 2r = 2 \times 10 = 200$ m

5. Perimeter of square $= 4 \times a$

$$\Rightarrow \qquad a = \frac{132}{4} = 33 \text{ cm}$$

$\therefore$ Area of square $= (a)^2 = (33)^2 = 1089 \text{ cm}^2$

Circumference of circle $= 132$ cm

$$\Rightarrow \qquad 2\pi r = 132 \qquad \Rightarrow \qquad 2 \times \frac{22}{7} \times r = 132$$

$$r = \frac{\overset{6}{132} \times 7}{2 \times 22} = 3 \times 7 = 21 \text{ cm}$$

$\therefore$ Area of the circle $= \pi r^2 = \frac{22}{7} \times (2)^2 = \frac{22}{\underset{1}{7}} \times 21 \times \overset{3}{21}$

$$= 22 \times 21 \times 3 = 1386 \text{ cm}^2 \qquad \ldots(2)$$

Clearly, circle has a greater area and by $= 1386 - 1089 = 297 \text{ cm}^2$

6. Let C_1 and C_2 be two concentric circles whose radii are

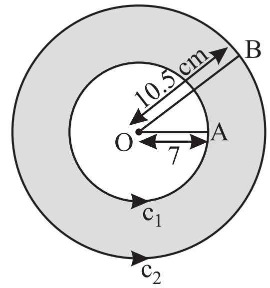
$r_1 = 7\,\text{cm}, r_2 = 10.5$

Area of inner circle $= \pi r_1^2$

Area of outer circle $= \pi r_2^2$

$\therefore$ Area of ring lying between the circumference of both the circles

$$= \pi r_2^2 - \pi r_1^2$$
$$= \pi [r_2^2 - r_1^2]$$
$$= \frac{22}{7} \times [(10.5)^2 - (7)^2]$$
$$= \frac{22}{7} \times (110.25 - 49)$$
$$= \frac{22}{7} \times 61.25 = 192.5\,\text{cm}^2$$



7. Inner circumference of circular track = 242 m

$\Rightarrow \quad 2\pi r_1 = 242$

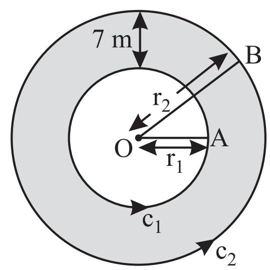
$\Rightarrow \quad 2 \times \frac{22}{7} \times r_1 = 242$

$$r_1 = \frac{\overset{11}{242} \times 7}{2 \times 22} = \frac{77}{2} = 38.5\text{ m}$$

$\therefore \quad r_2 = r_1 + 7 = 38.5 + 7 = 45.5\,\text{m}$

Area of the track $= \pi (r_2^2 - r_1^2)$

$$= \frac{22}{7} [(45.5)^2 - (38.5)^2]$$
$$= \frac{22}{7} [2070.25 - 1482.25]$$
$$= \frac{22}{7} \times 588 = 22 \times 84 = 1848\,\text{m}^2$$



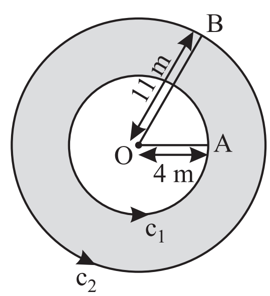
8. Let C_1 and C_2 be two concentric circle with centre O and radii are $r_1 = 4$ m, $r_2 = 11$m

$\therefore$ Area of inner circle $= \pi r_1^2$

Area of outer circle $= \pi r_2^2$

$\therefore$ Area of circular ring formed by the circumference of two concentric circles

$$= \pi r_2^2 - \pi r_1^2 = \pi [r_2^2 - r_1^2]$$
$$= \frac{22}{7} \times [(1)^2 - (4)^2]$$
$$= \frac{22}{7} \times [121 - 16] = \frac{22}{7} \times 105$$
$$= 22 \times 15 = 330\,\text{m}^2$$



$\because$ Cost of painting this ring of 1 m^2 Area of = ₹ 21

$\therefore$ Cost of painting this ring of 330 m^2 Area = ₹ $21 \times 330 =$ ₹ 6930

9. Area = 6.16 cm^2

$\Rightarrow$ Area = πr^2

$\Rightarrow$ $6.16 = \pi r^2 \Rightarrow 6.16 = \frac{22}{7} \times r^2$

$\Rightarrow$ $r^2 = \frac{7 \times 6.16}{22} = 7 \times 0.28 = 1.96$

$r = \sqrt{1.96} = 1.4$ cm

$\therefore$ Circumference $= 2\pi r = 2 \times \frac{22}{7} \times 1.4 = 8.8$ cm.

10. Given, circumference of circle = perimeter of square

$\Rightarrow$ $2\pi r = 4 \times \text{side}$ $\Rightarrow$ $2 \times \frac{22}{7} \times r = 4 \times 11$ cm

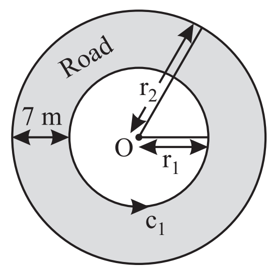
$\Rightarrow$ $\frac{44}{7} \times r = 44$ cm

$\therefore$ Area of circle $= \pi r^2 = \frac{22}{7} \times (7)^2 = \frac{22}{7} \times 7 \times 7 = 154$ cm^2

11. Circumference of the park = 352 m

$\Rightarrow$ $2\pi r_1 = 352$

$\Rightarrow$ $2 \times \frac{22}{7} \times r_1 = 352$



$\Rightarrow$ $r_1 = \frac{\overset{8}{\cancel{16}}\;\cancel{352} \times 7}{2 \times 22} = 8 \times 7$

$\Rightarrow$ $r_1 = 56$ m

$r_2 = r_1 + 7 = 56 + 7 = 63$ m

The Area of th road $= \pi r_2^2 - \pi r_1^2 = \pi[r_2^2 - r_1^2]$

$= \frac{22}{7} \times [(63)^2 - (56)^2] = \frac{22}{7} \times [3969 - 3136]$

$= \frac{22}{7} \times [833] = 22 \times 119 = 2618$ m^2

12. Given, $C - r = 37$ cm, or $2\pi r - r = 37 r(2\pi - 1) = 37$

$r\left(2 \times \frac{22}{7} - 1\right) = 37$

$r\left(\frac{44-7}{7}\right) = 37 r\left(\frac{37}{7}\right) = 37$

$\Rightarrow$ $r = \frac{7 \times 37}{37} = 7$ cm

Area of the circle $= \pi r^2$

$= \frac{22}{7} \times (7)^2 = \frac{22}{7} \times 7 \times 7$

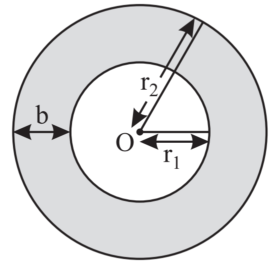
$= 154$ cm^2

13. Given, $A_1 = 1386$ cm^2 $A_2 = 1886.5$ cm^2

$\Rightarrow$ $\pi r_1^2 = 1386$

$\Rightarrow \quad \frac{22}{7} \times r_1^2 = 1386$

$$r_1^2 = \frac{\overset{63}{1386} \times 7}{\underset{1}{22}} = 63 \times 7 = 441$$



$\Rightarrow \quad r_1 = \sqrt{441} = 21\,\text{cm}$

again, $A_2 = 1886.5$

$\Rightarrow \quad \pi r_2^2 = 1886.5$

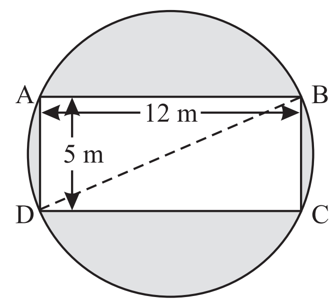
$\Rightarrow \quad \frac{22}{7} \times r_2^2 = 1886.5$

$$r_2^2 = \frac{1886.5 \times 7}{22} = \frac{13205.5}{22} = 600.25$$

$\Rightarrow \quad r_2 = \sqrt{600.25} = 24.5\,\text{cm}$

width of the ring $= r_2 - r_1 = 24.5 - 21 = 3.5$ cm

14. Area of $ABCD = l \times b = 12 \times 5 = 60\,\text{m}^2$



Draw D to B.

Thus, we get 2 triangles, ΔABD and ΔBCD

Now, In ΔABD, $\angle A = 90°$,

$\therefore$ by Pythagoras theorem

$$BD^2 = AB^2 + AD^2$$
$$= 12^2 + 5^2$$
$$= 144 + 25 = 169$$
$$BD = \sqrt{169} = 13\,\text{m}$$

$\Rightarrow$ diameter of the circle $(d) = DB = 13\,\text{cm}$

$\therefore \quad r = \frac{d}{2} = \frac{13}{2} = 6.5$ m

Now, Area of the circle $= \pi r^2$

$$= 3.14 \times \left(\frac{13}{2}\right)^2 = 3.14 \times \frac{169}{4}$$

$$= \frac{530.66}{4} = 132.665\,\text{m}^2$$

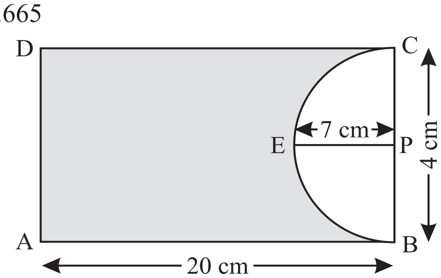
Area of the shaded region = Area of circle – Area of rectangle $ABCD$

$= 132.665 - 60 = 72.665$

15. Area of paper $ABCD = l \times b$

$= 20 \times 14$

$= 280\,\text{cm}^2$



Area of semi circle portion $= \frac{1}{2} \pi r^2$

$= \frac{1}{2} \times \frac{22}{7} \times 7 \times 7$

$= 11 \times 7 = 77\,\text{cm}^2$

$\therefore$ Area of the remaining part = Area of rectangle $ABCD$ – Area of semi circle

$= 280 - 77 = 203\,\text{cm}^2$